University of Agronomic Sciences and Veterinary Medicine of Bucharest
Faculty of Horticulture

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Figs – raw material for obtaining alcoholic fermented beverages

Emilia Moisescu

Coordinator Professor Antoce Arina Oana

I.Introduction

1.1. Taxonomy

The fig tree (*Ficus carica* L.), native to Middle East (Caria - Turkey, Mesopotamia, Palestine, Egypt), is at present spread out in all Mediterranean area and throughout the world, where it has found good conditions to grow and develop fruits. (China, Japan, Australia, Latin America, etc.).

In contrast to other cultivated species, **the fig tree has a great genetic variability**, **because unlike other species, the fig tree has not been subjected of intensive breeding programs**.

The American horticulturist I. Condit described over 600 fig genotypes, many of them producing high quality fruits.

- Scientific name: *Ficus carica*
- Common name: Smochin
- Genus: Ficus
- Family: Moraceae
- Order: Rosales
- Clade: Magnoliopsida
- Increngatura: Tracheobionta
- Regnul: Plantae

1.2. Chemical composition

The figs contain 78-84% water, carbohydrates– invert sugar (17,5%), protide, organic acids: citric, galic, clorogenic, syringic, oxalic, quinic, malic, succinic, acetic, cellulose. Mineral salts: ca, mg, cu, Mn, Br, K, Fe, Na, carotenoid pigments, anthocyanins pigments, vitamin: A,B1,B2,B3,B5,B6,K,PP), enzymes (ficine, lipodiastase- enzyme analogous to pancreatic juice), pectine, fibers, fatty acids (omega 3 and omega 6), phytosterols, tryptophan.

1.3. Purported therapeutical actions

- High blood pressure
- Fragile bones
- Frequent insomnia
- Difficult digestion, constipation
- Extra pounds
- Skin conditions, dehydrated skin
- Circulatory and renal disorders
- Tonsillitis, stomatitis, colitis, gastritis
- Vitiligo (latex)
- Diabetes (leaves)
- Irregular menstruation
- Prostatitis
- Physical and mental asthenia
- Anti-inflammatory effects
- Corns, boils, warts (latex)
- Antioxidant
- Antibacterial (*Staphylococcus aureus*, *E.coli*-the fruit ; *S.anginosus*, Porphyromonas gingivalis-leaves; *Bacilus cereus, S. Epidermidis-latex*)

1.4. Contraindications

The figs contain oxalates which cause loss of Ca and Fe. Not recommended, in excess, for young children, pregnant women, a people with anemia or kidney disease.

1.5. Ways of eating figs

I.6. Main objectives

- Designing an optimized technological process for the production of an alcoholic fermented beverage from figs

- Evaluation of the content and sensory properties of the obtained beverage

II. Materials and Methods

- **II.1. Vegetal material**
- **II.2. Laboratory equipment/ methods of analysis**
- **II.3. The technological process of obtaining fermented alcoholic beverages**
- **II. 4. Senzory evaluation method**

II. Materials and Methods

II.1. Vegetal material

Fruit were collected from Svinița, South-West part of Romania, in August 2020.

Figs - Genotype G1

Figs – Genotype G2

Figs – Genotype G3

II.2. Laboratory equipment/ methods of analysis

II.2.1. Determination of chemical characteristics of fruits

Digital refractometer

Grinding mill

Analytical balance

Automatic titrator

Multiparameter device

Portable refractometer

II.2. Laboratory equipment/ methods of analysis

II.2.2. Substances and materials used in the production of fermented fig drinks

- Mineral water Zizin (Romania), purchased from public trade
- Lyophilized *Saccharomyces cerevisiae* yeast
- Powder pectinolytic enzymes
- Sugar, fermentation activator, tartaric acid, potassium metabisulphite

These components were provided by the Laboratory of Oenology, Faculty of Horticulture, USAMV Bucharest

II.2. Laboratory equipment/ methods of analysis

II.2.3. Determination of chemical characteristics of the fermented fig beverage

- pH of the beverage was determined by direct measurement with portable pH-meter

Portable pH-meter

Alcoholic concentration of the beverage was determined through the Simple distillation method STAS 6182/6-70

Distillate collection

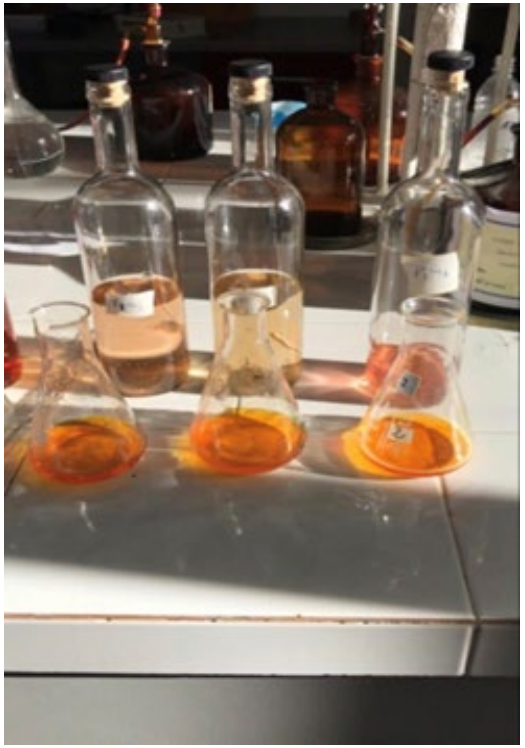
Temperature measurement

Determination with alcoholmeter

Volatile acidity was determined by the Titrimetric method with phenolphthalein as indicator, STAS 6182/2-86

Total acidity was determined by the Titrimetric method with bromothymol blue as indicator, STAS 6182/1-79.

Determination of volatile acidity



Determination of total acidity

Determination of free sulfur dioxide was performed using Iodometrical method by direct dosing, STAS 6182/13-72

Determination of total sulfur dioxide was performed using Iodometrical method by direct dosing, STAS 6182/13-72

Reducing sugars were determined using SCHOLL iodometrical method, STAS 6182/18-81

Determination of reducing sugars

II.3. The technological process of obtaining fermented alcoholic beverages from figs

Figs

Fig pasta

Sugar solution

Dense solution of figs, water, sugar, tartaric acid

Fermentation

Racking

Filtration

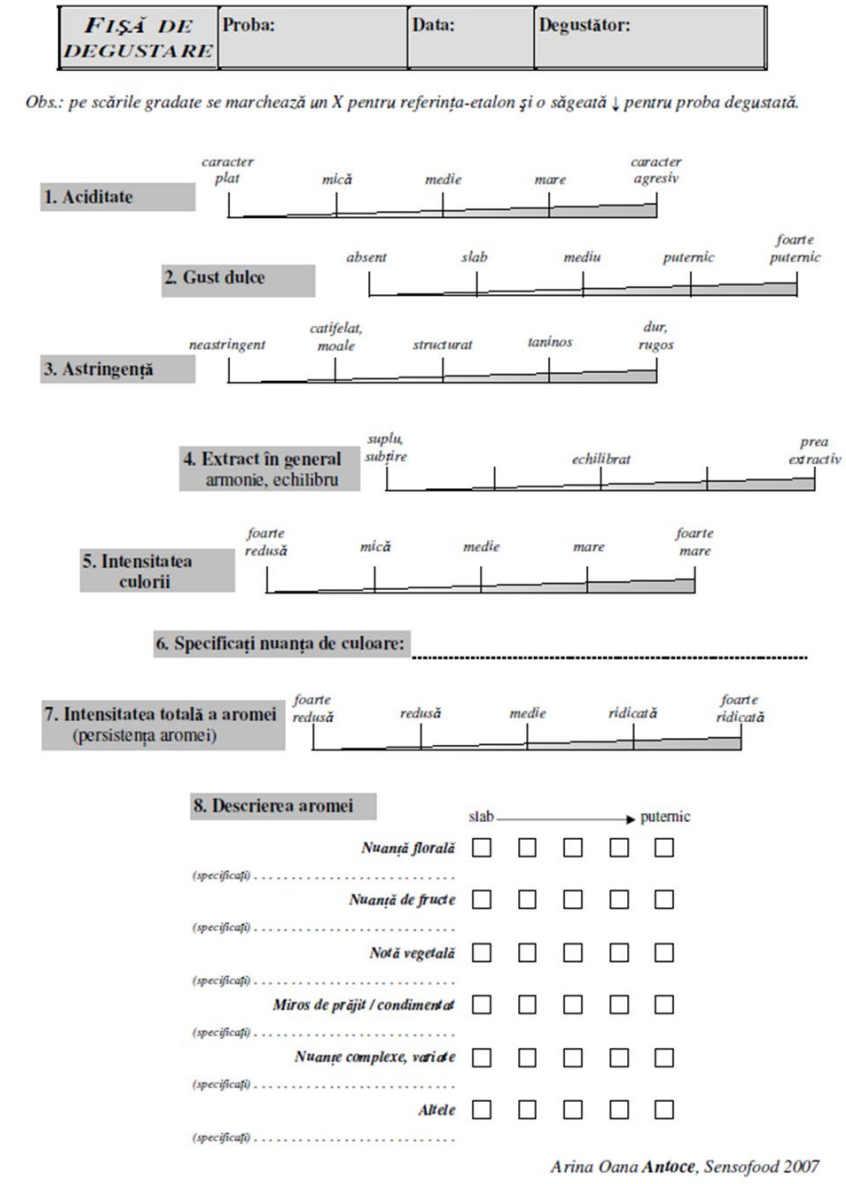
Potassium metabisulphite solution

Sulphitation

Racking from the fine lees

Storage

II.4. Sensory evaluation



FIŞĂ DE DEGUSTARE	Proba:	Data:	Degustător:

Obs.: pe scările gradate se marchează un X pentru referința-etalon şi o săgeată ↓ pentru proba degustată.

1. Aciditate: caracter plat — mică — medie — mare — caracter agresiv

2. Gust dulce: absent — slab — mediu — puternic — foarte puternic

3. Astringență: neastringent — catifelat, moale — structurat — taninos — dur, rugos

4. Extract în general armonie, echilibru: suplu, subțire — echilibrat — prea extractiv

5. Intensitatea culorii: foarte redusă — mică — medie — mare — foarte mare

6. Specificați nuanța de culoare: .....

7. Intensitatea totală a aromei (persistența aromei): foarte redusă — redusă — medie — ridicată — foarte ridicată

8. Descrierea aromei (slab → puternic)

- Nuanță florală (specificați) .....
- Nuanță de fructe (specificați) .....
- Notă vegetală (specificați) .....
- Miros de prăjit / condimentat (specificați) .....
- Nuanțe complexe, variate (specificați) .....
- Altele (specificați) .....

*Arina Oana **Antoce**, Sensofood 2007*

The sheet used to perform sensory evaluation was modified after:

- **Arina Oana ANTOCE** (2007). *Oenologie; Chimie şi analiză senzorială (Oenology – Chemistry and sensory analysis)*, Editura Universitaria Craiova, 817 pagini. ISBN 978-973-742-879-0.
- **Arina Oana ANTOCE**, Ioan Constantin Nămoloşanu, 2007, *"Metodă de realizare a unui profil senzorial pentru definirea şi evaluarea tipicităţii vinurilor"*(*Method for sensory profile construction for defining and evaluating wine tipicality*), **Brevet Invenţie 123129 eliberat pe 30.11.2010. (**Romanian Office of Inventions and Trademarks Patent **123129/2010)**

III. Results and discussions

III.1. Determination of the total soluble solids of fig fruits, measured in (°Bx)

Genotype	G1	G2	G3
Average	13.95	15.97	13.98

III.2. Determination of fig fruit acidity, mg/l citric acid

Genotype	G1	G2	G3
Average	0.212	0.114	0.100

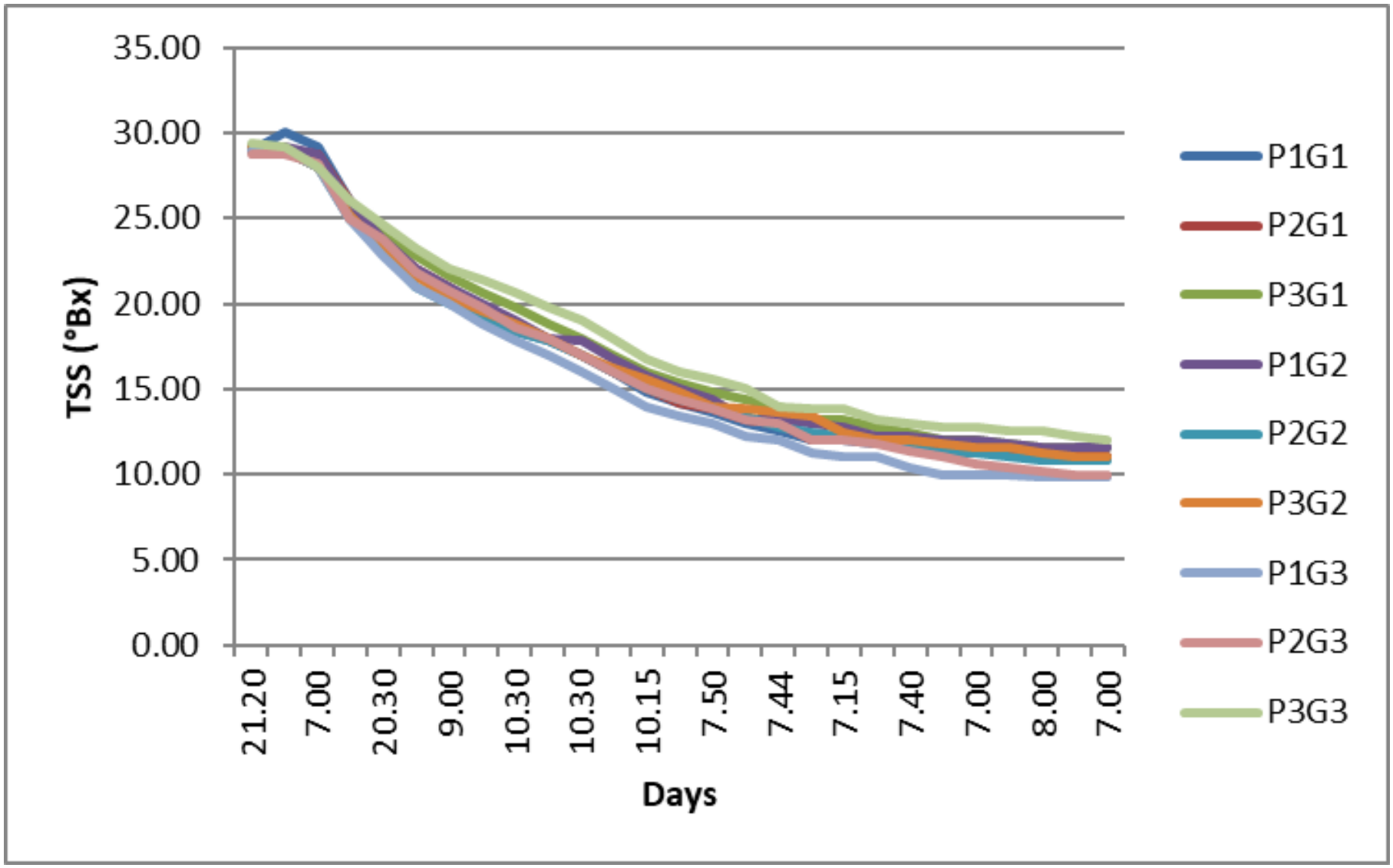
III.3. Determination of the total soluble solids of fig sugar solution (°Bx)

Genotype	G1	G2	G3
°Bx	29	29	29

III.4. Determination of the pH of the fig sugar solution

Genotype	G1	G2	G3
pH	4.71	5.51	6.12

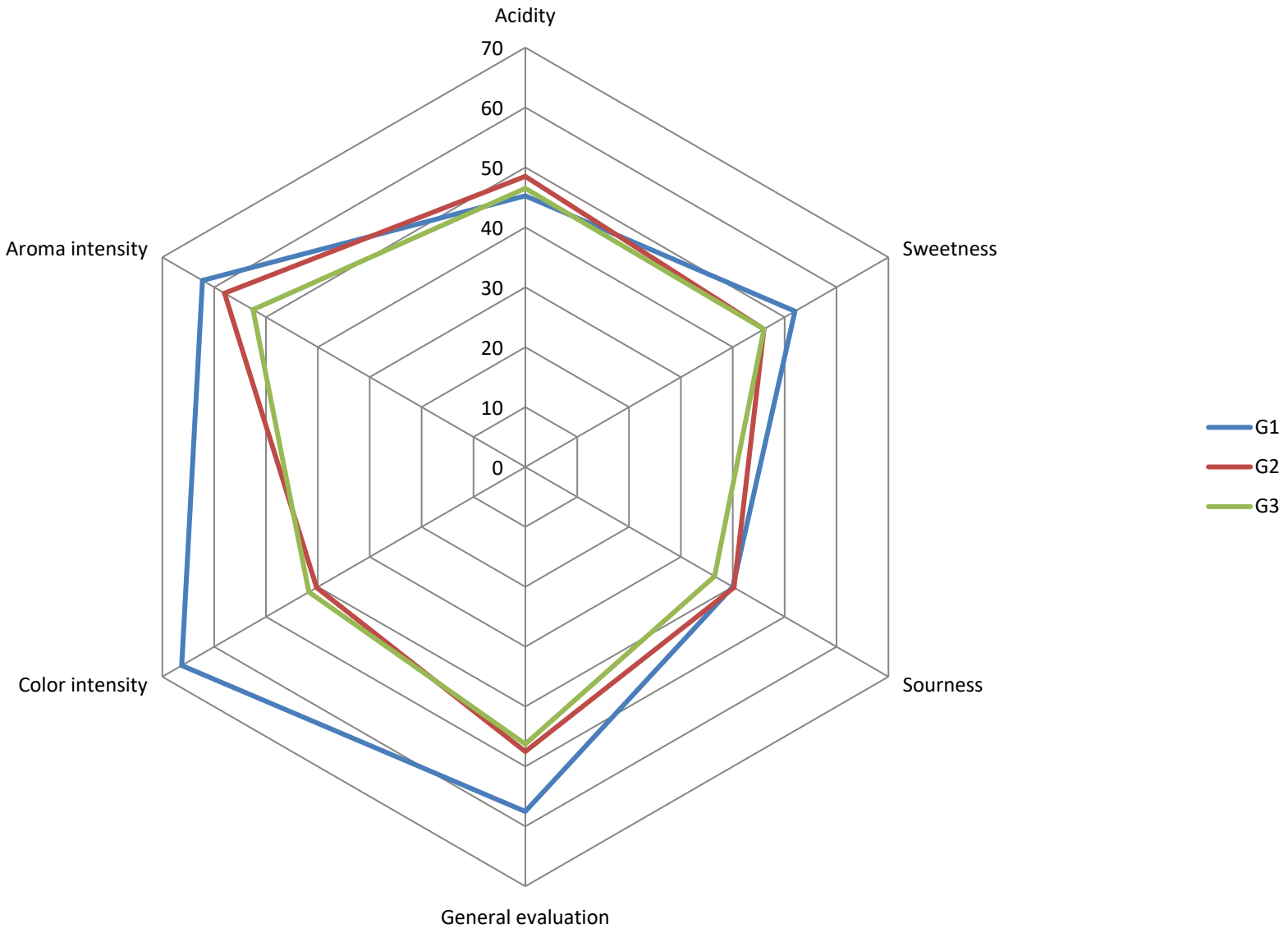
III.4. Evolution of the total soluble solids in the fermented fig beverage, measured in (°Bx)



III.5. Results of main parameters of the fermented alcoholic beverages from figs

Genotype	pH	Alcohol (% vol.alc.)	Volatile acidity acetic acid g/l	Total acidity tartaric acid g/l	Reducing sugar g/l	Free SO_2 mg/l	Total SO_2 mg/l
G1	3.7	17.80	0.55	5.46	18.00	22.25	103.60
G2	3.6	17.80	0.49	5.54	16.20	11.86	106.81
G3	3.6	17.60	0.53	5.23	14.80	14.83	111.20

III.6. Evaluation of the sensory properties of the fermented beverage from figs



IV. Conclusions and recommendations

- All the samples started from approximately equal soluble content values, having a similar evolution as regards the consumption of sugar during fermentation and transformation into ethanol and CO_2. The active fermentation took place in the same period for all the samples, its slowing down being followed by stagnation, also in the same period, in the last three days of observations.
- The results of the physio-chemical analyses of alcoholic beverages from figs are within the limits accepted for human consumption.

IV. Conclusions and recommendations

- The graph of some sensory characteristics shows that, samples G2 and G3 of fig drinks presented similar characteristics, while sample G1 has much higher values in terms of color intensity, extract in general, flavor intensity and sweet taste, being considered the best, flavorful and balanced of the three.
- In the end, we can say that figs can be used to obtain fermented alcoholic beverages.

V.Bibliografy

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